Remarks/Arguments

Paragraph 3 of the office action of 10/22/2009, rejected Claims 1 as being anticipated by Moore (3,661,202).

The fluid thermal expansion and contraction is not anticipated by Moore, since he has both liquid and vapor of the same liquid sealed in his system. The thermal expansion of the fluid merely decreases the volume of the gas and raises its pressure slightly. I recite a system that is full of fluid only. When the fluid thermally expands more than the tubes it is contained in, the system pressure can reach several hundred PSI, and fluid is allowed to leave the system through a pressure relief valve.

Paragraph 5.a of the office action of 10/22/2009 "There is no mention in Moore of being "Hermetically Sealed", rejected Claim 1 as being anticipated by Moore (3,661,202) who recites a heat pipe system which uses a vapor to transport heat from on surface to another in a closed container, which is filled partially with liquid and the other part with the vapor of the same liquid. He recites a sealed system where vapor can not leave and air can not get in.
Column 1 Paragraphs 3 Lines 23 to 26 of Moore's Background of Invention lays out his Definition of a heat pipe system, which is what all of his claims pertain to.
"*In a heat pipe as a closed chamber charged with a material that coexists in vapor and liquid phases at the operation temperatures of the heat pipe. Other gases are generally excluded* ."The dictionary defines **hermetic**-(hər-mĕt ĭk) also **her·met·i·cal** (-ĭ-kə) *adj.***1.** Completely sealed, especially against the escape or entry of air". Liquid and its condensable vapor are sealed in Moore's chamber and no air or liquid is let in or out.

Column 4 Paragraphs 3 Lines 30 to 37 of Moore's, What is Claimed

> "1. Heat transfer apparatus comprising:
> a vaporizer of capillary material having a first surface portion in thermal contact with a heat source, a second surface portion, and a third surface portion,
> a partly condensed fluid, a portion of said fluid being liquid and another portion being vapor, said liquid wetting said vaporizer capillary material;...."

Column 28 Paragraphs 6 Lines 48 to 54 In Moore's Claim 19 "Closed Loop Heat Transfer Apparatus" he reiterates the condition of the closed liquid and vapor system of his invention. In his invention since no gas or liquid is let into or out of the closed system as the temperature of the liquid and vapor rise, so does the pressure inside the closed chamber. According to the gas laws PV=nRT. P= pressure of gas, V=volume of

closed chamber and nR are gas constants and T = Temperature. So if Volume in the chamber is constant and Temperature rises so must the pressure.

Column 28

"19. Closed loop heat transfer apparatus comprising :
A vaporizer of capillary material, having a first surface portion in thermal contact with a heat source, a second surface portion, and a third surface portion;
a partly condensed fluid, a portion of said fluid being liquid and another portion being vapor, said liquid wetting said vaporizer capillary materials;..."

I recite a heat transfer loop which is completely full of nonflammable and low toxicity heat transfer fluid absorbs heat and gets hotter in one part of the loop and gives off heat and gets cooler in another part of the fluid filled loop. There is no wetted capillary material as Moore claims. Where the liquid material in the loop stays in the liquid form this is sensible heat transfer. The difference between my heat transfer loop and Moore's is that my loop has a pressure relief valve normally set at 16 PSI. The Volume in my loop is constant like Moore's but I have a way to vent the liquid and vapor created by the solar collector temperature reaching the boiling point of water at 16 PSI pressure which is 247°F to exit the heat transfer loop by a pressure relief valve and recover the condensed vapor as liquid later when the heat transfer loop cools off. Hence I let liquid and vapor out of the heat transfer loop and liquid back in. Moore does not let anything out of or into his heat transfer loop. When steam appears in my loop the Pressure is fixed at, 16 psi and Temperature is fixed at, 247°F and both are held constant. Moore's system can not do this, pressure and temperature are not fixed, they move up and down together. If the pressure in his heat pipe is 16 psi and Temperature is 247°F if the temperature goes to 360°F the pressure will go to 75 psi if the fluid and vapor in Moore's heat pipe are of the same material, ie water and steam (water vapor). He depends on a wick to hold the water in contact with a heated wall, and then the water vaporizes taking on the heat of vaporization 540 cal per gram, then giving up this heat by condensing on the colder wall at a different location, When solar energy causes the water to boil in my loop, I use the same principle of a heat pipe that Moore uses, but I condense only a fraction of the steam in my liquid to air radiator and let the rest blow by the pressure relief and bubble through the overflow, which condense more steam as it heats the fluid in the overflow and a very small amount of steam escapses to the atmosphere. I recite boiling the water in the collector thereby taking heat from it and that steam is partially condensed in the liquid to air radiator, partly condensed in the overflow liquid and some heat given up to the air. When the heat input to the collector is stopped, all steam in the collector loop and radiator condense, causing the loop pressure to go sub-atmospheric. Once this happens fluid from the overflow is drawn back into the system via the vacuum recovery valve and the solar collector loop is again full of only liquid.

Moore's loop is partially full of fluid with the balance of the volume filled with vapor of the same composition as the fluid. His loop is hermetically sealed, so no air, vapor or fluid can get in or out. Moore recites heat transfer using a phase change from the liquid to gas. His liquid absorbs heat, turning it to vapor (Heat of Vaporization), in another part of the system the vapor gives up heat and condenses to a liquid. My loop lets liquid out as the fluid expands more than the container and then lets fluid back in as the fluid cools and contracts. My system is not hermetically sealed (meaning nothing can get in or out, like the sealed system in your refrigerator) and hence not a closed system. I recite a way to let fluid and vapor out of my system using a pressure relief valve and a way to let fluid only return to the system.
Moore has a closed system I do not.

Moore does not anticipate or claim my heat transfer loop.

Paragraph 4 of the office action of 10/22/2009 rejected Claims 2, 3, and 13 as being anticipated by Hardy (4,360,003). I have carefully reviewed the cited patent and believe that my claims are not anticipated by Hardy (4,360,003).

Hardy claims a set of three valves all connected to a pressurized potable hot water flow loop which is potable water and subject to freezing at 32°F. I claim a flow loop filled with nonflammable and low toxicity heat transfer fluid, which is non-potable antifreeze/ water mixture subject to freezing at -54°F.

Hardy's pressurized potable water loop is bathed in an unpressurized water bath surrounding the wood burning boiler. Pressure is needed to allow hot water to be drawn for showers and domestic uses; it is also needed to operate all of the valves connected to the pressurized water loop. These three valves listed in Claim 1 are (1) float valve, (2) vacuum breaker valve and (3)relief valve. The functions of these valves are also listed in Claim 1.their functions are:
(1) "the float valve controlled outlet means coupled to said tubing within the water tank to fill the tank to a predetermined level" (Column 8 lines 9-12)
(2)"vacuum breaker means coupled to said inlet for said tubing preventing siphoning of tank water into the domestic water system" (Column 8 lines 6-9)
(3)"relief valve means coupled to said tubing providing relief in the event of excessive water temperature and pressure in said tubing." (Column 8 lines 12-14)

Hardy, Claim 1 (Column 7,Lines 45 to 53 and Column 8, Lines 1 to 14)

Column 7

"said ash bin, means automatically controlling the flow 45

of heated water from said water tank through said home heating system and return to said tank in response to the demand of the home heating system and the temperature of the water in the tank, said flow controlling means including temperature sensing means for sensing the temperature of water in said tank, and said temerature sensing means being electrically connected to a home heating system thermostat, a relay electrically

Column 8

Connected to said temperature sensing means and said home thermostat, a pump for pumping water from the water tank through the home heating system, said pump being electrically connected to said relay, whereby the pump is operable only when the temperature of water in said water tank reaches a predetermined value and said home thermostat calls for heat, vacuum breaker means coupled to said inlet for said tubing preventing siphoning of tank water into the domestic water system, float valve controlled outlet means coupled to said tubing within the water tank to fill the tank to a predetermined level and relief valve means coupled to said tubing providing relief in the event of excessive water temperature and pressure in said tubing."

Hardy in Claim 1
(1) float valve. I have no such valve in my system and do not need one.

(2) vacuum breaker valve. The water in his water bath surrounding the wood burning boiler is not sanitary and unfit to drink. The vacuum breaker valve Hardy claims is needed to prevent unsanitary water from being siphoned into the potable water system. The vacuum breaker valve is defined as a valve that is held closed by the pressure in the potable hot water system this valve activates if and only if the pressure in the hot water system is lost and will only let air into the potable water system and will not allow unsanitary boiler water to be drawn into the potable water system. Hardy's valve will not let any fluid into the potable or water system.

I recite a vacuum fluid recovery valve, even though it sounds like Hardy's valve it does not function in the same way. My valve has a totally different function since it is a one

way valve which lets fluid back into the heat transfer loop when the pressure falls below atmospheric, which happens every night when the sun goes down. The valve I recite is not designed to let any air into the system, it is designed to keep it out.

(3) relief valve. In Hardy's Claim 1 "relief valve means coupled to said tubing providing relief in the event of excessive water temper-ature and pressure in said tubing". This is a standard temperature pressure relief valve found on most hot water heaters today. It uses a spring to push one side of the valve closed and if the pressure exceeds 125 psi the valve will open and release the pressure from the potable water loop. This same valve has a temperature probe, which will open the valve at 210°F even if the pressure is below the 125 Psi. In Hardy's Claim 1, his relief valve is designed to vent fluid or steam to the atmosphere outside of the pressurized loop and never recover either the water or steam so discharged.

The Standard Temperature/Pressure Relief Valve is a Grainger Item #4X563.

T And P Valve, Residential, Material of Construction Bronze, BtuH Rating 100, 000, Inlet 3/4 In, Outlet 3/4 In, MNPT x FNPT Connection, Height 3 1/2 In, Width 1 7/8 In, Thermostat Length 4 In, Max Pressure 150 PSI, Temp 210 F, Spring Material Stainless Steel, Standards ASME Rated, CGA Listed, Meet FHA Specifications, Military Spec, MIL-V-13612C, Rated by AGA for Heaters Up to 100000 Btu/HR Input ANSI Z21.22 Standard and UL listed

The pressure relief valve I claim uses the same principle of a spring pressing against the pressure inside the fluid heat transfer loop. My valve relieves the pressure at 16 psi and keeps the temperature in the fluid loop less than 247°F and has no temperature probe to open the valve, only pressure. My valve allows fluid and any steam to pass through it into an overflow recovery reservoir. The fluid is collected and the steam condensed to fluid. The fluid and condensed steam in the reservoir is then available to the vacuum recovery valve to be drawn back into the fluid loop when it cools and the pressure drops below atmospheric which happens each night.

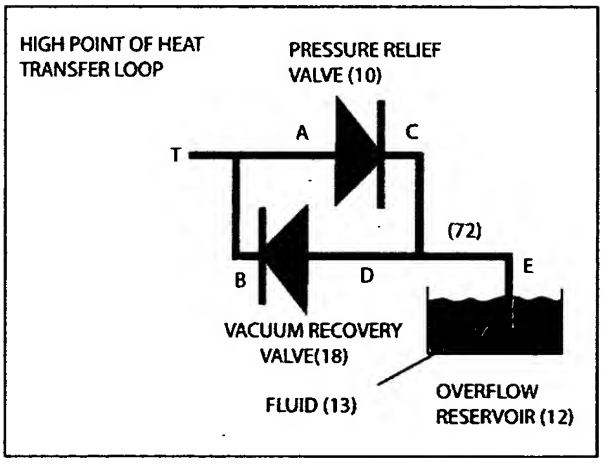
Hardy in Claim 3 recites an overflow pipe. The water in his water bath surrounding the wood burning boiler is not sanitary and unfit to drink. This water tank is kept full of water at a predetermined level by the (1)float valve recited in his claim 1. If the float valve fails, (Float valve of this type are used on older toilets to keep their tanks full) the fluid level in the water bath tank will rise until it reaches the overflow pipe. Then it would drain to the furnace room floor and down the floor drain, never to be recovered or used again.

Hardy, Column 8, Claim 3 Lines 50 to 53

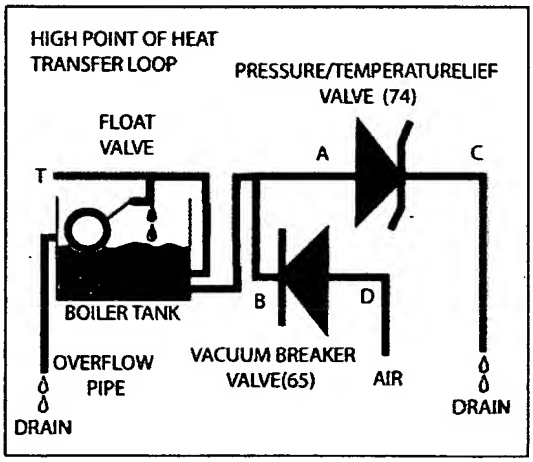
Column 8

3. The heating system of claims 1 or 2 wherein said Tank is coupled to an overflow pipe to remove excess water in the tank when present. 50

Hardy claims an overflow pipe, even though it sounds like an overflow recovery reservoir which I claim. The two are not the same. My overflow recovery reservoir is designed to hold liquid released from the heat transfer loop by thermal expansion of the fluid and any condensed steam. The fluid from the reservoir is reintroduced to the heat transfer loop via the vacuum recovery valve when the heat transfer loop cools off at night. Hardy's overflow pipe is used to send excess water down the drain. Hardy's overflow pipe does not connect to a reservoir. He does not claim my invention.



CLAIMED BY BUTLER IN HIS FIGURES 2,6,7,8 & 9



CLAIMED BY HARDY IN HIS FIGURE 2.

I have drawn the schematic pictures of my claimed configuration and Hardy's side by side so the differences can be clearly shown. I recite in Figure 2, 6, 7, 8 & 9 a pressure

relief valve (10) and a vacuum fluid recovery valve (18), which are in parallel, but both are connected to Overflow Reservoir (13), below the fluid level by pipe (72). In Hardy's arrangement the pressure relief valve **74** discharges water/steam into the air and down the drain and the vacuum breaker valve **65** draws only air back into the closed loop to prevent boiler reservoir non-potable water backflow into the domestic water fluid loop through float valve **69**. I submit that Hardy has parallel pressure relief 74 and vacuum "breaker" relief **65** valve which go from the fluid loop to the atmosphere, which is fundamentally different from the parallel pressure relief (10) and vacuum "fluid recovery" relief (18) valves which go from the fluid loop to below fluid level in the overflow reservoir (12) which I have recited, hence Hardy has not anticipated my invention. In my Figure 2 above A, B & T are all tied together. Hardy does recite an overflow pipe from his boiler tank, which again goes down the drain. Nowhere does he recite an overflow reservoir to save the over flow or pressure vented fluids, they go through air then down the drain, with no intention of reuse in the system he recites. The same is true for Hardy's Figure 2 above. In my patent application C & D are tied to E, which extends below the fluid level in the overflow reservoir (12). In Hardy's patent, C & D are not tied together and each vents separately to the air. The vacuum breaker (65) pipe D allows air to enter the loop if it is un-pressurized. The pressure relief (74) pipe C allows water and steam to escape, to the air, but will not let any fluid back into the heat transfer loop.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully Submitted,

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